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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/593,772	09/22/2006	Go Ono	0171-1311PUS1	9154

2292 7590 05/12/2010
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EXAMINER	
CLARK, GREGORY D	

ART UNIT	PAPER NUMBER
1786	

NOTIFICATION DATE	DELIVERY MODE
05/12/2010	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

mailroom@bskb.com

Office Action Summary	Application No.	Applicant(s)	
	10/593,772	ONO ET AL.	
	Examiner	Art Unit	
	GREGORY CLARK	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *03 May 2010*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-12* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *02/18/2010*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

The examiner acknowledges the receipt of applicants' arguments dated 05/03/2010. Claims 1-12 pending.

Rejections and objections made in previous office action that do not appear below have been overcome by applicant's amendments and therefore the arguments pertaining to these rejections/objections will not be addressed.

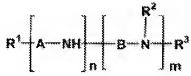
Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

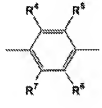
1. **Claims 1-9 and 12 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oka (JP-07-090179) in view of Nalwa (Journal of Materials Science, 26 (1991) p. 1683-1690).**

2. **Regarding Claims 1-3,** the applicant also claims a charge transporting varnish represented by Formula 1:



Formula 1

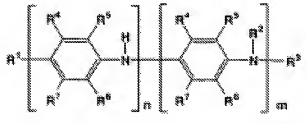
where R1-R2 are H , monovalent hydrocarbon group or organoxy group, R3 is an unsubstituted or substituted aryl group, A and B are divalent groups represented by Formula(s) 2 or 3:



Formula 2

Formula 3

Applicants' formula 1 can also be represented by formula 4:



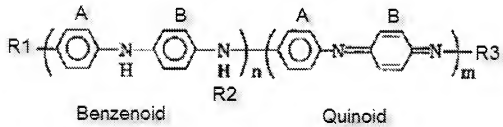
formula 4

Wherein formula can also be represented as the quinonediimine derivative.

Oka discloses a charge transporting substance made of a charge transporting polyaniline and a polyimide (abstract). The polyaniline-polyimide (polyamide acid) is soluble in a solvent (paragraph 8), is doped (paragraph 3) and has an average molecular weight of 2000 to 500,000 (abstract). Oka also discloses that the molecular weight of the polyaniline-polyimide complex is kept in a range have suitable solubility in

a solvent (paragraphs 6 and 7). The applicant claims an average molecular weight of 250 to 5000.

Oka also discloses that the charge transporting substance is represented the polyaniline Formula O-1 (below). Oka fails to mention a representative for R1 or the end-capping group, R3. The applicant claims R1 can be hydrogen and R3 as substituted or unsubstituted aryl.



Formula O-1

Nalwa discloses that an oligoaniline skeleton contains both the benzenoid and quinoid (referred as quinonediimine by applicant) ring structures (abstract) (as seen above in Oka's formula O-1). The applicants' only shows the benzenoid in formula 4.

Oka's formula O-1 shows A and B are phenyl groups which correspond to the phenyl groups in formula 4.

Oka fails to mention the R1 group.

The examiner takes the position that the phenyl ring to the far left in formula O-1 is the terminal ring position and the ring hydrogen para to the NH moiety corresponds to applicants' R1 group.

Oka fails to mention phenyl as an end-capping group.

Nalwa discloses that an oligoanilines can be end-capped with a phenyl group (page 1689).

The examiner takes the position that the nitrogen on the far right in the quinoid portion of formula O-1 represents the reactive site for propagation.

Whereas Oka does not mention the means to terminate the oligomer growth and Nalwa discloses the phenyl group can be used as an end-capping group, it would have been obvious to a person of ordinary skills in the art at the time of the invention to have selected from known end-capping groups which would have included the phenyl group as disclosed by Nalwa which reads on applicants' limitation for the R3 position, absent unexpected results.

3. **Regarding Claim 12,** Oka discloses that the charge transporting varnishing is represented by Formula O-1 (shown above) with an average molecular weight of 1000-500,000. The applicant claims 250-800.

Oka discloses that the molecular weight is kept in a range to have suitable solubility in a solvent (paragraphs 6 and 7). The average molecular weight is ultimately controlled by the propagation level.

The molecular weight is view as a cause effective variable for solubility of the charge transporting varnish. Lower molecular weight materials would be expected to have higher solubility. As Oka does not teach away from using lower molecular weight materials and such materials would be expected to improve solubility, one could

envisage a skilled artisan making a series of materials at various molecular weights to determine which range offered suitable solubility properties.

With a reasonable expectation of success, a person of ordinary skill in the art at the time of the invention would test a series of polymers with varying propagation levels to determine which range gave suitable solubility properties which would have included the claimed range, absent unexpected results.

4. **Regarding Claim 4,** Oka discloses that the repeat unit values for n and m are as follows: m +n = 10-5000. The applicant claims m+n is less than or equal to 6.

Oka explains that molecular weight affects the ultimate solubility of the polymer. Polymers with molecular weights that are too high would be expected to have lower solubility in a solvent.

With a reasonable expectation of success, a person of ordinary skill in the art would test a series of polymers with varying (different valve of m +n) molecular weight ranges to determine which range give suitable solubility properties which would have included the range claimed by the applicant, absent unexpected results.

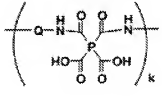
5. **Regarding Claims 5,** Oka discloses a weight ratio of polyaniline to polyamide is 1:0.1 - 1:10 which equates to a polyaniline weight range of 90% (1/1.1) to 9% (1/11) (paragraph 12). The applicant claims a % wt. of 0.1 to 50 wt. %.

The range taught by Oka is not exactly the same as that of applicant however there is substantial overlap.

It would have been obvious to a person of ordinary skill in the art at the time of the invention to have adjusted to weight range to optimize the solubility of the oligomer which would have included the overlapping portion of the range, absent unexpected results.

6. **Regarding Claims 6,** Oka discloses that the polyimide precursor is represented by O-1 (shown below) with an average molecular weight of 1000-500,000. The applicant claims 1,000-50,000.

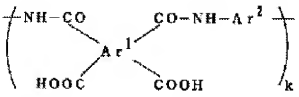
7. **Regarding Claim 7,** the applicant claims a polyimide precursor represented by Formula 8:



Formula 5

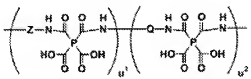
where Q can be a divalent phenyl group and P can be a tetravalent phenyl group.

Oka discloses formula O-2 shows a tetravalent organic group corresponding to applicants' P group and a divalent Ar2 group corresponding to applicants' Q group (paragraph 4).



O-2

8. **Regarding Claims 8 and 9,** the applicant claims a polyimide precursor represented by formula 21:



Formula 21

Z and Q are divalent groups. Z is selected from applicants" formula(s) 22-27.

Oka discloses a polyimide precursor represented by O-2 (shown above). Oka also discloses that the polyimide precursor can be made by the reaction of a tetracarboxylic dianhydride or tetracarboxylic ester or tetracarboxylic acid halide with a diamine (paragraphs 9 and 10).

Oka further discloses that other diamines based on phenylenediamine and diaminobiphenyl (Z groups, the class of compounds listed in applicants' structures 22-27 in claim 9) can be used to make polyimides precursors that are analogous to applicants' Formula 21. The phenylenediamine or diaminobiphenyl compounds can have the following groups attached: methylenebis (aniline), bis (aminophenoxy) bezene, bis (aminophenoxy) biphenyl and bis [(aminophenoxy) phenyl] propane.

Oka also indicates the above groups can be further substituted (defined as W in the applicants' structures 22-27) with halogens, alkoxy (methoxy, ethoxyl, propoxy) groups, or alkyl groups (methyl, ethyl, propyl) (paragraph 9 and 10).

In essence, Oka discloses a polyimide precursor that can contain both Z and Q groups.

It would have obvious to a person of ordinary skill in the art at the time of the invention to have used a combination of diamine species defined as Z and Q groups in Formula 21 to make suitable polyimide precursors through a reaction with a tetracarboxylic derivative.

Oka fails to disclose a propagation level of u1/(u1 +u2) as greater than or equal to 0.2.

Oka discloses that the molecular weight is kept in a range to have suitable solubility in a solvent (paragraphs 6 and 7). The average molecular weight is ultimately controlled by the propagation level.

With a reasonable expectation of success, a person of ordinary skill in the art at the time of the invention would test a series of polymers with varying propagation levels to determine which range gave suitable solubility properties which would have included the propagation level claimed by the applicant, absent unexpected results.

9. **Claims 10-11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oka (JP-07-090179) in view of Nalwa (Journal of Materials Science, 26 (1991) p. 1683-1690) and Kin (JP-11-185962).**

10. **Regarding Claims 10 and 11,** Oka and Nalwa teach the invention of Claim 1 but fail to mention a charge transporting thin film or usage in an organic electroluminescent device.

It is common in the art to form a thin film layer from polyanilines for use in electroluminescent devices.

Kin discloses a doped polyaniline (charge transporting substance) (paragraphs 28-30) and the dopant can be benzenesulfonic acid (charge transporting dopant) (paragraph 30). The polymers are soluble in organic solvent (paragraph 39).

Kin also discloses a thin film layer (charge transporting varnish) (paragraph 32) as a component of an electroluminescent device (abstract).

As Kin discloses a similar type of conducting polyaniline material, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have used the polyaniline materials of Oka as a thin film layer in an electroluminescent device, absent unexpected results.

Response to Arguments

Applicant argues that there is no motivation to cap the end of polyaniline with phenyl groups.

The charge transporting materials of Oka which are polyaniline based materials read on applicants' claimed materials but Oka fails to mention the end-capping group. Oka does mention that the molecular weight is controlled to allow for the solubility of the

polymer. As the awareness of the need to control molecular weight is clearly articulated by Oka, it would have been obvious to a person of ordinary skill in the art the time of the invention to have selected from known methods terminate the polymer propagation which would have included end capping groups commonly used with similar polymers.

Nalwa shows that polyaniline based charge transporting oligomers are often end-capped with a phenyl groups. At the time of the invention a person of ordinary skill in the art would have selected from known methods to end-cap the oligomer propagation which would have included the approach disclosed by Nalwa which reads on applicants' limitation.

Applicant argues that there is no teaching in Oka for using a material with a molecular weight of below 2,000 and offer specification pages 11-12 to support applicants' unique features.

The examiner counters that Oka does mention that the molecular weight is controlled to allow of solubility of the polymer. The awareness of the need to control molecular weight is clearly articulated by Oka. Oka does not teach away from using lower molecular weight materials and such materials would be expected to improve solubility, one could envisage a skill artisan making a series of materials at various molecular weights to determine which range offered suitable solubility properties. Applicants' specification mentions that a molecular weight below 250 gives rise to materials that are too volatile and molecular weight above 5000 give rise to material with low solubility. As Oka teaches materials within this range and does not teach away from using low molecular weight materials, the selection of a suitable molecular weight

range is viewed as well within the knowledge of one of ordinary skill in art and readily determined through routine experimentation.

Applicant argues that there is no motivation to combine Oka and Nalwa with Kin.

The examiner counters that Oka and Nalwa teach the claimed materials as charge transporting materials. Kin clearly shows that the same class of material is commonly used in electroluminescent devices. As Kin discloses a similar type of conducting polyaniline material, it would have been obvious to a person of ordinary skill in the art at the time of the invention to have used the polyaniline materials of Oka and Nalwa as a thin film layer in an electroluminescent device, absent unexpected results.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to GREGORY CLARK whose telephone number is (571)270-7087. The examiner can normally be reached on M-Th 7:00 AM to 5 PM Alternating Fri 7:30 AM to 4 PM and Off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Larry Tarazano can be reached on (571) 272-1515. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/
Supervisory Patent Examiner, Art Unit 1786

GREGORY CLARK/GDC/
Examiner
Art Unit 1786